Exemption No. 6822

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of

Raytheon E-Systems

for an exemption from §§ 25.562(c)(2) through (c)(4), 25.785(h)(2), 25.813(e) and 25.853(d) of Title 14, Code of Federal Regulations

Regulatory Docket No. 29301

PARTIAL GRANT OF EXEMPTION

By letter dated August 3, 1998, Mr. Paul Sallas, Manager, Designated Alteration Station, Raytheon E-Systems, PO Box 154580, Waco, TX, 76715, petitioned for exemption from the requirements of §§ 25.562(c)(2) through (c)(4), 25.785(h)(2), 25.813(e) and 25.853(d) of Title 14, Code of Federal Regulations (14 CFR), to permit installation of interior doors between passenger compartments, side facing divans, flight attendant seats that do not provide direct view, and interior materials that do not comply with heat release smoke emissions requirements on a Boeing 737-700 Increased Gross Weight (IGW) airplane.

The petitioner requests relief from the following regulations:

Section 25.562(c)(2) through (c)(4) - Establishes human injury criteria for emergency landing dynamic conditions as applicable to side facing divans.

Section 25.785(h)(2) - Requires that flight attendant seats be located to provide a direct view of the passenger cabin.

Section 25.813(e) - Prohibits installation of interior doors in between passenger compartments.

Section 25.853(d) - Limits maximum heat release rates for large panel cabin interior materials.

The petitioner's supportive information is as follows:

"GENERAL BACKGROUND

"The phenomenal growth in the past few years of the so-called executive, VIP, or Head-of-State transport airplane market has clearly tested the fabric of the rules promulgated to insure their safety. Transport Airplane Category rules, [Federal Aviation Regulations] FAR Part 25, have evolved over the past three decades in an environment dominated by the emerging commercial carrier industry. It is not, therefore, difficult to understand why new safety standards for transport airplanes promulgated during this period responded to the commercial airline safety concerns associated with conveying large numbers of relatively inexperienced travelers and did not envision the current needs of the private executive operator.

"The Boeing 737-700 IGW, referred to in the industry as the Boeing Business Jet or BBJ, is a special purpose derivative aircraft of earlier 737 models whose certification basis did not include the regulations referenced in this petition. The special purpose for this model is to 'privately' transport very reduced numbers, usually less than 30% of the airplane's capacity as normally configured for airline operation, of executives on business or pleasure trips. The importance of the intended 'private' use for these aircraft should not be understated in these Petitions for Exemption. The aircraft will be excluded from Part 121 operations and will therefore not be used on a 'for hire' basis. In considering the granting of this request the petitioner would accept an FAA requirement to exclude an airplane so configured from Part 121 operations.

"PETITIONS

"In consideration of the intended private use of this airplane supported by the justifications presented herein, the petitioner requests Exemptions from the following applicable rules:

"1. FAR PART 25.562(c)(2) through (c)(4):

'(c) The following performance measures must not be exceeded during the dynamic tests conducted in accordance with paragraph (b) of this section: . . .
(2) The maximum compressive load measured between the pelvis and the lumbar column of the anthropomorphic dummy must not exceed 1,500 pounds.
(3) The upper torso restraint straps (where installed) must remain on the occupant's shoulder during the impact.
(4) The lap safety belt must remain on the occupant's pelvis during the impact.'

"Exemption:

"When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the human injury criteria of FAR 25.562(c)(2) through (c)(4) for side facing divans but required to meet the head injury criteria of FAR 25.562(c)(5).

"General Information:

"When Amendment 25-64 and later rules were promulgated, side facing divan (sofa) installations were not adequately considered for Transport Category Airplanes. With the sudden growth in the VIP or executive transport airplane market the side-facing seat and divan configurations have become quite common. Considering the specific human injury criteria embodied in FAR §§ 25.562(c)(2) through (c)(6) together with § 25.785(d) it is clear that application of the referenced regulations to side facing divans with multiple occupants does not result in an equivalent level of safety as afforded the occupant of either forward or aft facing seats. Strict compliance with the referenced regulations has been determined to be neither practicable nor desirable for the subject application. The only recourse for applicants with similar configurations who desire FAR certification of their interior modification is through exemption to the general injury requirements of § 25.562(c)(2) through (c)(4) as invoked by § 25.785(b).

"This Petition for Exemption offers certain measures intended to achieve an equivalent level of safety to that intended by the applicable regulations, giving consideration to the derivative aircraft status of the Boeing Model 737-700 IGW and its intended use.

"Justification and Safety Considerations:

"Of the human injury criteria currently included in §§ 25.562(c)(2) through (c)(6), the petitioner feels the single most critical criterion because of the high potential for occupant death, and the one for which the petitioner feels can most practically be dealt with considering the current state of design technology, is the Head Impact Criteria (HIC) in §§ 25.562(c)(5). It is interesting, however, that the type certified airline version of this airplane, the Model 737-700, excludes §§ 25.562(c)(5) and (c)(6) from the certification basis.

"In light of these considerations and following the petitioner's conclusion that compliance with the HIC requirements is practical for the requested seating arrangement, it is proposed that the divans be tested to show compliance with the 14g and 16g requirements of § 25.562(b) and the HIC requirement of § 25.562(c)(5) but that the remaining occupant injury criteria of §§ 25.562(c)(2) through 25.562(c)(4) be waived. The petitioner believes that exclusion of the excepted rules and inclusion of some head strike requirement such as § 25.562(c)(5) is appropriate for a derivative aircraft having the special purpose discussed herein and offers an improved level of safety for the most severe type of injury commonly experienced where occupant death occurs.

"The specific means that the petitioner proposes to use for compliance with the HIC requirement of § 25.562(c)(5) is to remove by design all potential body-to-body and body-to-structure/furnishing contact so that no such impacts could occur during the dynamic loading tests required by § 25.562(b). Each divan side-facing seat location that is occupiable during taxi, takeoff, and landing operations would be equipped with a safety belt and shoulder harness and the divan would be placarded accordingly for use during taxi, takeoff, and landing operations to prevent contact of the occupant with structure/furnishings or another occupant in a farther forward position. It is also proposed that all testing of the divans be in accordance with the applicable portions of §§ 25.561 and 25.562, except those specifically excluded by this proposal, using Anthropomorphic Test Dummies (ATD) in their appropriate taxi, takeoff, and landing positions.

"2. FAR Part 25.785(h)(2):

'(h) Each seat located in the passenger compartment and designated for use during takeoff and landing by a flight attendant required by the operating rules of this chapter must be: . . .
(2) To the extent possible, without compromising proximity to a required floor-level emergency exit, located to provide a direct view of the cabin area for which the flight attendant is responsible.'

"Exemption:

"When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the flight attendant viewing requirement of FAR 25.785(h)(2) except that voice contact with all passengers would be maintained.

"General Information:

"The most common design feature found in executive interiors is the 'privacy area.' Compartmentalizing airplanes into rooms introduces several certification challenges. Owing to this compartmentalization, a certification issue often arises with regard to flight attendant viewing of passengers. In order to transport the desired number of passengers, it is often necessary for some passengers to occupy rooms during taxi, takeoff, and landing operations that are remote from emergency exits.

"As is frequently the case in less densely occupied executive interior arrangements, there exists an excess of emergency exits, the low passenger levels require only a very limited number of flight attendants according to FAR 91.533(a)(1), and rooms tend to limit direct passenger viewing by the required flight attendants. It would seem that the applicable rules clearly give priority to the flight attendants' duty to be near an emergency exit and secondarily to passenger direct viewing.

"Justification and Safety Considerations:

"As stated above, seating arrangements for large transport category executive type aircraft are often not conducive to direct viewing of every passenger by flight attendants because of the lack of density seating in the cabin area and the requirement to give proper consideration to the flight attendants' primary responsibility of proximity to the floor level emergency exits. However, the language of § 25.785(h)(2) does not require full viewing of every passenger as indicated by the words 'to the extent possible, without compromising proximity to a required floor level exit.' It is worthwhile to note that if this same airplane were limited to 19 passengers, no flight attendant would be required and, therefore, no direct viewing requirement would be in effect.

"The petitioner contends that the subject interior arrangement offers proper consideration to the flight attendants' responsibilities without compromising either proximity to the required emergency exits nor direct viewing of the majority of the cabin occupants. It is believed that if this arrangement is not in strict compliance with § 25.785(h)(2), it provides a measure of safety equivalent to that intended by this regulation. The small number of passengers combined with the largely open seating arrangement provides an improved level of passenger awareness which results in increased flight attendant awareness. Although some passengers may only be partially observable by either flight attendant, they are in easy voice contact with at least one flight attendant. Finally, because of the use for which this airplane is intended, the degree of viewing and the level of familiarity with the airplane and its occupants by the flight attendant crew will be greater than it would be if the airplane were operated in an air carrier configuration where direct viewing of some passengers is frequently blocked either by bulkheads or the seat backs themselves.

"3. FAR Part 25.813(e):

'(e) No door may be installed in any partition between passenger compartments.'

"Exemption:

"When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the interior door prohibition of FAR 25.813(e) except that door position indication will be provided.

"General Information:

"In the years just prior to the recodification of CAR 4b into FAR 25 the CAA issued NPRM 63-42 (28 FR 11507, October 23, 1963) which was proposed in an effort to achieve improved crashworthiness for Transport Category Airplanes. However, before

the conclusion of the public rulemaking process concerning these issues was complete all of the former CAR 4b rules were recodified into FAR 25 on December 24, 1964 (29 FR 18289). Those rules were essentially those found in the former CAR 4b and did not incorporate any of the crashworthiness proposals of NPRM 63-42. However, shortly after this recodification the FAA issued Amendment 25-1 (30 FR 3204, March 9, 1965) which incorporated NPRM 63-42 crashworthiness proposals originally intended for incorporation into CAR 4b.

"Included in the crashworthiness measures incorporated by Amendment 25-1 was § 25.813(e) which read, 'No door may be installed in any partition between passenger compartments.' That rule stands today and is a prohibition against doors in partitions separating 'passenger compartments.' Interestingly enough, § 25.813(d) states, 'If it is necessary to pass through a passageway between passenger compartments to reach any required emergency exit from any seat in the passenger cabin, the passageway must be unobstructed. However, curtains may be used if they allow free entry through the passageway' and § 25.813(f) reads, 'If it is necessary to pass through a doorway separating the passenger cabin from other areas to reach any required emergency exit from any passenger seat, the door must have a means to latch it in open position. The latching means must be able to withstand the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, listed in § 25.561(b).'

"The petitioner offers that the purpose of these rules was clearly an effort to prevent the obstruction of doorways or passageways leading to any required emergency exit <u>even after the aircraft has been subjected to the ultimate inertia forces, relative to the surrounding structure, listed in § 25.561(b)</u>. It is also felt that the promulgators of these rules were envisioning the relatively high seating density encountered in normal airline interior configurations where passengers may not be very familiar with their surroundings. However, it is not felt that the rule, although strictly applicable, envisioned the type of interiors typically found in what are referred to as executive configurations. The interiors of these airplanes are commonly divided into multiple compartments or rooms with doors to permit a measure of privacy. It is clear that these doors could conceivably be in an emergency egress path. Under the subject rule if such a doorway was in a non-occupiable compartment for taxi, takeoff, and landing operation (i.e. not a passenger compartment), it would be acceptable but the door must have a means to latch it in open position and remain open after the aforementioned ultimate loads are applied (§ 25.813(f)). On the other hand, if the same room had just one occupant, there could be no door (§ 25.813(e)).

<u>"Justification and Safety Considerations:</u>

"Although the initial interior door configuration proposed in drawing DAS-P737-1, Rev. IR, would be strictly in compliance with § 25.813(f), later arrangements requested by the petitioner will include interior doors on occupied rooms. Therefore, the petitioner

requests relief from the subject regulation at this time to preclude any delays that could eventuate from a subsequent exemption effort.

"The petitioner believes that to achieve an equivalent level of safety intended by §§ 25.813(d)-(f) it must be substantiated that any passageway or doorway leading to a required emergency exit cannot be obstructed under any taxi, takeoff, and landing operation irrespective of the compartment configuration but including the condition imposed upon the doorway when it is subjected to the ultimate inertia forces, relative to the surrounding structure, listed in § 25.561(b). Of course, this interpretation is not strictly in accordance with § 25.813(e) which expressly forbids doors between passenger compartments. In the case described in drawing DAS-P737-1, Rev. IR, the configuration does not strictly have a door between passenger compartments but rather two doors between a passenger compartment and two emergency exits. These doors are on rooms or compartments that are not occupiable during taxi, takeoff, and landing operations. This then would invoke the requirement imposed by § 25.813(f) which requires doors on such 'areas' to be latched open during taxi, takeoff, and landing operations and withstand the aforementioned ultimate inertia loads. However, the petitioner envisions additional near-term additional arrangements for its 737-700 IGW customers that include doors on compartments occupied by passengers.

"Having summarized the specific issues facing this interior arrangement, the petitioner proposes the following design measures, features, and analysis that are believed would result in an equivalent level of safety to §§ 25.813(d)-(f). First, all internal cabin doors in emergency egress routes would be securely latched open during taxi, takeoff, and landing operations (and placarded accordingly) and would be shown to be capable of withstanding the aforementioned ultimate inertia loads. Second, each door on an occupied room in an egress route will be equipped with position sensing and a crew light to alert the crew if any subject door is unlatched any time the seat belt signs are illuminated. Third, although the passenger capacity for these arrangements will be less than the 44 limit which would require compliance with § 25.803(c), the petitioner proposes to complete an evacuation analysis substantiating that all passengers and crewmembers can be evacuated from the airplane within the time prescribed by § 25.803.

"The petitioner contends that these design measures combined with an analytical substantiation of the evacuation capability of this configuration assures a level of safety equal to that intended by the referenced regulations.

"4. FAR Part 25.853(d)

'(d) Except as provided in paragraph (e) of this section, the following interior components of airplanes with passenger capacities of 20 or more must also meet the test requirements of parts IV and V of Appendix F of this Part, or other approved equivalent method, in addition to the flammability requirements prescribed in paragraph (a) of this section:

(1) Interior ceiling and wall panels, other than lighting lenses and windows;
(2) Partitions, other than transparent panels needed to enhance cabin safety;
(3) Galley structure, including exposed surfaces of stowed carts and standard containers and the cavity walls that are exposed when a full complement of such carts or containers is not carried.'

"Exemption:

"When limited to operation under FAR Parts 91 and 125 for the configurations described herein be exempt from the interior material heat release requirements of FAR 25.853(d).

"General Information:

"Airplane post-crash fire safety has been a significant concern to the FAA, its predecessor CAA, and the industry since the close of World War II when the numbers of people who were enjoying the benefits of air carrier service began a dramatic rise that continues to this day. The changes in the rules starting with rudimentary horizontal material flammability tests promulgated in CAR 4b until today's FAR 25 rules requiring 65/65 heat release testing have followed the unfortunate post-crash fire incidents experienced as a result of major air carrier crashes. The FAA and industry alike have worked together to improve airline safety and these cooperative efforts have resulted in the standards now in place in FAR § 25.853 for transport category airplanes.

"A careful study of the development of these rule changes reveals that a steady improvement in cabin fire safety occurred as a result of implementation of these rules because we were gaining a better understanding of the post-crash fire scenario. It is worthwhile to read and understand the reasoning of those who came before us and our contemporaries regarding the issue of fire safety. And there is no better way to do this than to review FAA Reports and NPRM citations. While the petitioner will not cite these here, their references will be cited for those interested in knowing the reasoning behind the rules. The following references will be useful for this purpose:

"NPRM 69-33 (34 FR 13036; August 12, 1969)
ANPRM 74-38 (39 FR 45044; Dec. 30, 1974)
NPRM 75-3 (40 FR 6505; February 12, 1975)
NPRM 75-31 (40 FR 29410; July 11, 1975)
FAA Report FAA-ASF-80-4 (SAFER)
NPRM 84-5 (49 FR 21010; May 17, 1984)
NPRM 84-11 (49 FR 31830; Aug. 8, 1984)
NPRM 84-21 (49 FR 47358; Dec. 3, 1984)
NPRM 85-10 (50 FR 15038; April 16, 1985)
Amdt. 25-61 (51 FR 26206; July 21, 1986)
NPRM 90-12 (55 FR 13886; April 12, 1990)
Amdt. 25-83 (60 FR 6616; Feb. 2, 1995)

"With the sudden growth in the VIP or executive transport airplane market together with the simultaneous introduction of more stringent interior material flammability standards, aircraft interior modifiers have been faced with a serious dilemma in resolving the styling requirements of the private aircraft owner/operator of these executive aircraft and the flammability requirements imposed by § 25.853. For the most part, modifiers have been able to simultaneously satisfy both the styling and interior material flammability requirements of §§ 25.853(a) and (c) with great effort and diligence; however, many of the materials required in these aircraft interiors simply cannot pass the 65/65 heat release requirement of § 25.853(d) no matter how diligent the designer is. It is not within the grasp of current technology to make certain natural materials conform to these standards and the owners of these airplanes define, in fact demand, the use of these materials. It should be understood that these aircraft must be outfitted in a style not unlike fine executive board rooms or luxurious residences to satisfy their private users.

"Justification and Safety Considerations:

"Having reviewed the evolution of the interior material flammability rules cited above, the petitioner believes most readers would arrive at the same conclusion we have. The vast majority of these rules were driven by the post-crash fire experiences in airline operations. The 65/65 heat release regulation was specifically developed to reduce the likelihood of the flash-over phenomenon which was proven by tests to be a prime contributor to the rapid propagation of post-crash cabin interior fires and the generation of blinding smoke. Rapid fire propagation combined with the relatively slow rate of passenger evacuation from densely packed air carrier airplanes has proven to be a deadly combination during actual airline accidents. Throughout the citations that ultimately resulted in the promulgation of these rules is one common theme. As late as 1995 the FAA restated a continuing point that every previous citation stressed when in Amendment 25-83 (60 FR 6616; February 2, 1995), the FAA states:

'Summary: These amendments clarify standards adopted in 1986 [Amdt. 25-61] concerning the flammability of components used in cabins of certain transport category airplanes. This action is taken to preclude costly, unintended changes to airplane interiors. The clarifications, *which are applicable to air carriers, air taxi operators and commercial operators,* as well as manufacturers of such airplanes, will result in more appropriate, consistent application of those standards.' [*emphasis added*]

"It seems very evident from this recapitulation of the current flammability standards which have evolved since the late 1960s that the FAA's intent and primary thrust was to improve cabin fire safety for 'commercial carriers' and these regulations were specifically not intended to overburden private operators and designers of transport category airplanes configured for VIP or executive use. Why the language of the final rules do not clearly reflect this intent was quite probably a matter of rulemaking expediency but could have just as well been done to elicit the very kind of dialog currently being undertaken for this type of aircraft operator. History has proven that rules are often written so that they can provide the greatest benefit relative to safety while

permitting interpretive processes to adjust for changing applications. This may well be the case with the flammability rules because the majority of today's VIP configured transport category airplanes simply cannot comply with the 65/65 heat release requirement for many of its materials. Regrettably, the market for U.S. Type Certificated executive configured large transport aircraft (more than 20 passengers) requiring U.S. registry has been dramatically slowed because modifiers could not comply with the subject flammability rules. This has not only been an economic burden for U.S. modifiers and operators but has sometimes resulted in 'Field Approvals' of strictly noncompliant airplanes by unsuspecting modifiers or registration of aircraft in foreign countries that do not require compliance. In any event, this is an unacceptable situation to be perpetuated.

"The petitioner offers that the subject airplane modification presents certain design features and operational characteristics that compensate for the lack of strict compliance with § 25.853(d). A review of the 65/65 heat release test requirements which reflect criteria that are characteristic of flash-over conditions indicates a critical correlation between both time (2 minutes) and peak rate of heat release and heat flux. The designer then should have two rather than just one design element at his discretion when considering the flash-over phenomenon. Since it is clear that material selection is being controlled by aesthetics in this application, the modifier cannot exercise any real control over the actual heat release but the exposure time to this heat release is still within the designer's control. Therefore, it is proposed as a first step in mitigating the fire hazard that an evacuation analysis be performed to show that all souls on board can be safely evacuated in less than 60 seconds. This would be possible because of excess emergency exits for the airplane passenger capacity, two flight attendants, and smooth evacuation routes. Although § 25.803(c) does not require such a demonstration or analysis for aircraft having less than 44 passengers and when it is required the occupants are given 90 seconds to safely evacuate the airplane, the petitioner feels that developing such substantiation data provides documentation supporting an equivalent level of safety to that intended for air carriers required to comply with § 25.853(d). In addition, the petitioner proposes to test each applicable material in accordance with FAR 25, Appendix F, Part IV, as required by § 25.853(d) and document the results in a report.

"The petitioner considers the compensating factors in the subject design together with the reduced evacuation time to be of such significance as to make compliance of the design equivalent to the intent of § 25.853(d).

"Public Interest:

"Granting these Petitions for Exemption is clearly in the public interest as it would permit the efficient transport of executives and Heads of State in an environment which would otherwise be impossible without this relief and, as evidenced by the petitioner's arguments contained herein, is both safe and essential to the growth of a world economy in which the United States must strive to remain a dominate force. The petitioner is one of the world's leading modifiers of large transport category executive and Head of State airplanes, provides jobs for thousands of engineers, technicians, and subcontractors, and is committed to remaining the leading outfitter of large transport airplanes with executive interiors. However, to continue this effort it is imperative that the petitioner be granted the regulatory relief requested herein. Failure to achieve this goal will result in billions of lost dollars in domestic and foreign trade for the United States, the petitioner, and the intended operators of these airplanes.

"Exception to Publication of Summary and Relief from 120 Day Notice Requirement:

"The petitioner requests these Exemptions to be granted within 45 days of receipt of the subject Petition by the Transport Aircraft Directorate [TAD]. Following is a showing of good cause in support of this request:

"1. With regard to the timely filing of petitions for exemption in accordance with 14 CFR Part 11, § 11.27(j)(3)(iii), the petitioner contends that all procedures were properly followed in this process by first seeking compliance through means of equivalent safety as strongly encouraged by the FAA (see citations found in FAA Orders 8100.5, paragraph 408, and 8110.4A, paragraph 14.h.). Initial formal written contact with the petitioner's Project ACO ASW-150 was made on January 17, 1998, and a letter of intent for the subject project citing the need for findings of equivalent safety was provided on February 17, 1998. The petitioner also met with ASW-150 personnel on July 14, 1998, for a briefing on the equivalent safety requests submitted to them and requested a meeting with the Transport Airplane Directorate. However, all of these events followed initial informal meetings between the petitioner and ASW-150 personnel in October 1997, regarding all of the executive interior compliance issues that the petitioner knew would be present in the next few years. Finally, in a meeting on July 29, 1998, with Transport Airplane Directorate staff the petitioner was formally advised of their decision to deny any consideration of equivalent safety requests in accordance with FAR 21.21(b)(1) for the subject regulations and applications.

"2. The petitioner will encounter significant economic loss owing to delivery delays and/or contract terminations if not granted the requested relief within 45 days. Details of these financial matters were reviewed with Transport Airplane Directorate staff in a meeting held on July 29, 1998, in the FAA TAD office.

"3. The Transport Airplane Directorate has for at least a year been aware of these issues and has been considering changes to these regulations to accommodate the growing public interest in executive interiors for transport category airplanes.

"4. In light of the urgency of these Petitions and in acknowledgment of FAA's long-term goal to develop a Special Federal Aviation Regulation in response to the recognition of this requirement, the petitioner contends that the 45-day notice for granting these Petitions can most effectively be achieved if granted under the waiver prescribed in 14 CFR Part 11, § 11.27(j)(3)(ii)."

A summary of the petitioner's request for Exemption appeared in the Federal Register on August 24, 1998 (63 FR 45104). One comment was received in support of the petition from a different division of the petitioner's parent company.

The FAA's analysis/summary is as follows:

As noted by the petitioner, the regulations regarding cabin safety have become much more stringent over the years, and generally increased the cost of certification. These requirements tend to have a greater impact on the privately operated transport segment, since the high degree of customization results in fewer opportunities to amortize costs. It should be noted that, while characteristic of this type of operation, the increased costs are only partially due to the requirements and largely due to preferences of the customers. While it is true that the major impetus for most of these changes is commercial operation, it is incumbent upon the FAA to upgrade design safety as the state of the art progresses, irrespective of the type of operation.

The FAA is giving great attention to the issue of transport category airplanes operated in private use. There are several regulatory requirements, including some identified by the petitioner, that lend themselves to consideration for modification when looking at the differences between commercial and private use operations. The FAA intends to summarize its views on these regulations and, ultimately, propose modifications to the requirements, where appropriate. It may be that the regulations that are the subject of this petition are included in the proposed modifications, and that additional design flexibility can be offered, when certain circumstances are met. This issue is not resolved at this time, however, and the particular interior in question must be addressed on its own merits.

The FAA will discuss each of the petitioner's requests in the order presented.

Side Facing Divans

The petitioner has requested relief from certain of the occupant injury criteria of § 25.562, but proposes to show compliance with § 25.562(c)(5), which is not required by the certification basis of the airplane. While the FAA is encouraged by this proposal, the sections for which relief is requested are, in fact, the most straightforward and well understood for side-facing divans. The FAA has acknowledged that there are not, at

present, injury criteria to demonstrate an equivalent level of safety for the occupants of multiple occupancy side-facing divans. For this reason, the FAA has published criteria which could be used in support of a petition for exemption from the requirements of § 25.785 for general injury protection. Because of the derivative nature of the Boeing 737-700 certification basis, these criteria are not applicable. That is, the basic requirements for the Boeing 737-700 would not dictate full compliance with § 25.562. The petitioner's proposed method of compliance appears to adequately address compliance with the certification basis of the Boeing 737, including the requirements of §§ 25.562(c)(2),(c)(3) and (c)(4). The FAA does not consider these sections unique to side facing seats in general, or divans in particular, in fact, compliance has been shown with these sections on other projects. Therefore, while the petitioners proposed method of compliance appears acceptable, an exemption for the sections requested is not justified.

Flight Attendant Direct View

The petitioner has identified the requirement for flight attendant seats to be located to provide a direct view of the passenger cabin as not practical for compliance with the executive type interior to be used on the Boeing 737-700. The complexity of the interior arrangement, coupled with the need to retain proximity to emergency exits is cited as the primary reason that compliance is impractical. The petitioner also notes that under the provisions of § 91.533, flight attendants are not required for passenger capacities of 19 or less. In addition, the petitioner contends that the passengers on this airplane will have a higher degree of familiarity with cabin interior which will tend to mitigate the need for direct view.

The FAA has considered the requirement for direct view in the context of private use airplanes, and agrees that much of the justification for the requirement is based on air carrier type operations. The practicality of locating flight attendant seats near emergency exits, and so that there is a direct view of occupants inside of rooms is questionable, at best. In this regard, the FAA does believe that some relief may be appropriate for airplanes intended for private use. The FAA notes that the requirement for direct view is not limited to observation of passengers that are not familiar with the interior, however. Flight attendant seats should be located so that there is a direct view provided for the cabin area that is practical. Flight attendant seats should not face away from the cabin, for example. Where flight attendant seats are not required, there is no issue. In this case, the FAA notes that the flight attendant seats installed generally do face the cabin, and satisfy the objective noted above.

In considering the need for direct view, the FAA agrees that the restricted nature of the operation of a private use airplane mitigates much of the need. That is, the operator has control of, and can restrict, the population of passengers, unlike an air carrier. The risk of passengers engaging in hazardous or malicious activity is essentially eliminated, and the need for direct view is limited to those cases where a passenger might need assistance. As noted above, the flight attendant seats currently provided satisfy this requirement, and the only area not within direct view is inside of the rooms.

Interior Doors

As noted by the petitioner, the regulations regarding interior doors were amended primarily to address doors in transverse partitions. Nonetheless, the concerns with these doors (namely potential to obstruct access to emergency exits as well as creating a potential for lack of recognition of exits beyond the door), apply to other types of doors as well. In fact, the current regulations do allow the installation of interior doors, provided passengers are not seated on both sides of the door for takeoff and landing. The FAA is concerned that doors not be located between passengers and exits, and has proposed to prohibit such installations in the future in Notice of Proposed Rulemaking 96-9.

The petitioner's discussion of the adequacy of the structural requirements to assure that a properly positioned door will remain in position following a minor crash landing accurately summarizes the requirements. Clearly, since the regulations currently allow the installation of some doors under these provisions, they are considered adequate. Jamming of doors, however, is not limited to doors that have been properly positioned. Neither does it exclude the potential for the door to jam before it can be properly positioned (due to mechanical failure, for example). The doors envisioned by the current regulations are more limited, more likely to be under direct crewmember control, and thus not as subject to these concerns. It is correct, however, that the rules do not make a distinction for the type of door, its orientation, or its location within the cabin. The FAA acknowledges that these factors may have a bearing on the reliability of the restraint means, as well as the procedures to ensure that the door is, and can be, open for taxi, takeoff and landing.

With respect to the possibility that a door will remain closed when it should not be, the FAA believes that a higher level of awareness is required to address this issue. Due to the relative complexity of the cabin interior, the FAA does not believe that inspection by flight attendants prior to takeoff and landing is sufficient to verify that interior doors are in their proper position. Consequently, some type of remote indication is considered necessary; the petitioner's proposal to provide remote indication to the flightcrew is considered adequate.

With respect to the integrity of the means used to latch doors open for takeoff and landing, the FAA considers that redundant means are necessary. Each latching means should have the capability of retaining the door in the takeoff and landing position under the inertia forces of § 25.561. In addition, the FAA believes that the door must be frangible, in the event that it is closed, or closes during an emergency landing. Frangibility may be demonstrated in accordance with the criteria set forth in Advisory Circular 25-17, paragraph 43.b(2).

As noted above, the FAA does not consider that all interior doors are equivalent. In the case of doors that open into rooms, for which only the occupants of the rooms must use the door to reach an exit, the FAA believes that there is a potentially acceptable installation. The FAA is not ready to entertain doors between passenger compartments that must be used by other persons to reach an emergency exit. For the airplane in question, this means that compartments currently including doors, but not occupiable for takeoff and landing, would not be permitted to be occupied for takeoff and landing under terms of this exemption. However, doors could be installed on certain of the rooms along the side of the fuselage.

Interior Materials

With respect to the flammability of interior materials, the petitioner has summarized the evolution of the requirements fairly completely. However in referring to the FAA's discussion regarding the cost of such new requirements, the issue is somewhat mischaracterized. In promulgating such rulemaking, the FAA must first determine that the state of the art allows for it, and then assess how the rulemaking is made applicable. Once the standard for improved materials were developed, it remained to establish an effectivity for implementation. In this case, the issue was to what degree should the rulemaking be made applicable to existing airplanes. In discussing the cost impact, it is this applicability that was at issue. There was no issue that the new standards should be made applicable to new type designs. That the FAA ultimately did not mandate a fleet retrofit is reflective of the cost/benefit studies done in support of the rulemaking, and subsequently. At issue here is whether the rule should be applied to airplanes that quite simply are designed with materials that do not comply.

In promulgating the rulemaking, the FAA did incorporate a discriminant based on passenger capacity, that was intended to address smaller airplanes, where the ratio of exits to passengers is typically quite good, and where the evacuation times are expected to be quite low. Under these conditions, the benefits of improved materials were expected to be negligible. The airplane type discussed in the petition was not envisioned by the rulemaking, insofar as the large size with low passenger count is concerned. The FAA has considered the issue of the evacuation capability of the airplane, relative to the flammability of the materials and believes that there may be some relief possible.

However, the issue of flammability is not limited to postcrash scenarios, and the inflight fire threat must also be addressed. The FAA notes that the petitioner has not proposed an alternative criteria, but rather an exemption from the requirement to assess the heat release and smoke emissions of materials altogether.

Since the main benefit of improved interior materials is to lengthen the time available for evacuation, an arrangement that effectively provides the same evacuation capability would satisfy much of the concerns addressed by the requirement, albeit indirectly. The FAA has reviewed the full-scale fire test data used to develop the heat release requirements, as well as considered accident data relevant to this issue. This review is not complete, but it does suggest that a quantifiable improvement in evacuation capability could warrant a relaxation of the heat release requirements. The FAA notes that the petitioner's estimate of the improvement in evacuation time offered by the reduced passenger capacity relative to the exit arrangement is, in fact, only marginally lower than that actually demonstrated by the original manufacturer, with a maximum passenger capacity. The FAA does not consider this adequate. In reviewing the data developed to date, the FAA considers that a one minute improvement in evacuation time over that allowed by the regulation would be required to relax the heat release and smoke emissions standards. That is, the actual passenger arrangement and exit configuration would have to show an evacuation capability of 30 seconds. The one minute improvement in evacuation time correlates with the benefits derived from the improved materials for the post crash scenario.

The remaining issue of the inflight fire scenario needs to be addressed as well. The major issue with respect to inflight fires is timely recognition. On some airplanes, the interior includes remote areas that do not lend themselves to timely detection of a fire. On this particular interior, the main such area is the aft cabin, aft of station 800. In order to address the inflight case, the FAA believes that installation of a fire detector in this area, that complies with § 25.858, would compensate for the potential for an increased inflight fire threat. While this section is written for cargo compartment fire detection systems, the criteria contained therein are considered appropriate to this application.

In consideration of the foregoing, I find that a partial grant of exemption is in the pubic interest and will not adversely affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in 49 U.S.C. 40113 and 44701, delegated to me by the Administrator (14 CFR § 11.53), the petition of Raytheon E-Systems for an exemption from the requirements of § 25.562(c)(2)-(4) is denied. The petition for exemption from the requirements of §§ 25.785(h)(2), 25.813(e), and 25.853 (d) to allow the installation of flight attendant seats that do not provide direct view of the cabin, to allow installation of interior doors, and to install interior materials that do not comply with heat release and smoke emissions requirements on a Boeing 737 airplane, is hereby granted, with the following provisions:

1. The airplane is not operated for hire, or offered for common carriage.

2. A majority of flight attendant seats must be oriented to face the passenger cabin.

3. No door may be installed in a compartment such that persons, other than occupants of the compartment, would have to pass through that door to reach an emergency exit.

4. Each door between passenger compartments must have a means to signal to the flightcrew when the door is closed. Appropriate procedures/limitations to ensure that takeoff and landing is prohibited, when such compartments are occupied and the door is closed, must be established.

5. Each door between passenger compartments must have dual means to retain it in the open position, each of which are capable of reacting the inertia loads specified in § 25.561 of the FAR.

6. Each door between passenger compartments must be frangible.

7. The airplane must be shown to be capable of being evacuated in 30 seconds or less, under the conditions described in Part 25, Appendix J.

8. There must be means, that meets the requirements of § 25.858(a)-(d), to signal the flightcrew in the event of a fire in the room area aft of fuselage station 800.

Issued in Renton, Washington, on October 8, 1998

/s/ Darrell M. Pederson
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Transport Airplane Directorate
Aircraft Certification Service, ANM-100